

RECONSTRUCTING PREHISTORIC SOCIOECONOMIES
FROM PALEOETHNOBOTANICAL AND
ZOOARCHAEOLOGICAL DATA:
AN EXAMPLE FROM THE BRITISH COLUMBIA PLATEAU

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ABSTRACT.—The Keatley Creek site, located on the British Columbia Plateau, is composed of 119 house depressions. In order to investigate the position of residential structures of different sizes in the socioeconomy at Keatley Creek, we compare the density, diversity, and distribution of the plant and animal remains recovered from the living floors of a small, medium-sized, and large housepit. In particular, we investigate whether differences in these residential structures correlate with differences in housepit socioeconomic status, and whether the larger housepits show evidence of distinct domestic subgroups, which themselves differ in socioeconomic status. This requires a number of methodological approaches that are not commonly used. The results of both the faunal and floral analyses indicate that density and diversity of remains do vary with housepit size. Taxonomic richness of both plants and animals suggest that more diverse activities took place in the largest structure. The faunal remains, but not the floral remains, support the hypothesis that the large housepit was divided into distinct domestic subgroups, possibly of unequal socioeconomic status. The distribution of floral and faunal remains from the medium-sized and small houses suggests that internal domestic subgroups were less pronounced and activities were undertaken more communally. A larger, more diverse sample is needed before we can make

more definitive statements about the prehistoric socioeconomy at Keatley Creek, but this study demonstrates the value of combining paleoethnobotanical and zooarchaeological analyses in studies of prehistoric social and economic organization.

RESUMEN.—El sitio arqueológico de Keatley Creek, ubicado en la región de la Meseta en Columbia Británica, Canadá, está compuesto de 119 depresiones habitacionales. Con el fin de investigar la posición de estructuras residenciales de diferente tamaño en la socioeconomía de Keatley Creek, comparamos la densidad, diversidad y distribución de los restos de plantas y animales recuperados de los pisos de una vivienda pequeña, una mediana y una grande. En particular, investigamos si las diferencias en estas estructuras residenciales se correlacionan con diferencias en estatus socioeconómico, y si los fosos habitacionales mayores muestran evidencia de subgrupos domésticos distintos que difieran entre sí en estatus socioeconómico. Esto requiere de un número de aproximaciones metodológicas que no son comunmente empleadas. Los resultados tanto de los análisis faunísticos como florísticos indican que la densidad y la diversidad de los restos sí varían en relación al tamaño del foso habitacional. La riqueza taxonómica de ambos, plantas y animales, sugiere que en la estructura mayor se llevaban a cabo actividades más diversas. Los restos de animales, mas no de plantas, apoyan la hipótesis de que el foso habitacional más grande estaba dividido en subgrupos socioeconómicos distintos, posiblemente de estatus socioeconómico desigual. La distribución de los restos florísticos y faunísticos de las viviendas medianas y pequeñas sugiere que los subgrupos domésticos internos eran menos pronunciados y que las actividades eran emprendidas en forma más comunitaria. Se requiere de una muestra mayor y más diversa antes de que podamos hacer declaraciones más definitivas acerca de la socioeconomía prehistórica en Keatley Creek, pero este trabajo demuestra el valor de combinar los análisis paleoetnobotánicos y zooarqueológicos en los estudios de la organización social y económica prehistórica.

RÉSUMÉ.—Le site de Keatly Creek, situé sur le Plateau de la Colombie britannique, est composé de vestiges de 119 maisons. Pour connaître le rôle de chacune des différentes structures résidentielles dans la vie économique et sociale de Keatly Creek, nous avons comparé la quantité, la diversité et la répartition des débris d'espèces végétales et animales trouvés dans les parties habitées d'une petite, d'une moyenne et d'une grande maison. Plus spécifiquement, nous avons cherché à savoir s'il y avait une relation entre la quantité, la diversité et la répartition de ces débris dans les différentes maisons et les différents statuts sociaux et économiques des occupants des maisons excavées et, dans le cas des grandes maisons, si des sous-groupes domestiques distincts avec des statuts sociaux et économiques différents ont pu coexister. Une telle recherche a nécessité l'emploi de plusieurs méthodes généralement peu utilisées. Les résultats des analyses des débris d'espèces végétales et animales montrent que la quantité et la diversité des mêmes débris varient effectivement en fonction de la taille des maisons. L'abondance taxinomique des débris à la fois floraux et fauniques suggère qu'il se tenait plus d'activités variées dans la grande maison. L'analyse des débris d'espèces animales, ce qui n'est pas corroboré par celle des débris d'espèces végétales, vient étayer l'hypothèse de la présence de sous-groupes domestiques distincts, à statuts sociaux et économiques probablement inégaux, dans la grande maison. La répartition des débris floraux et fauniques dans les deux autres maisons porte à

croire que la différenciation des sous-groupes domestiques y était moins prononcée et que les activités qui s'y tenaient étaient plus communautaires. Il faudra examiner un échantillon plus important et diversifié avant de se prononcer de façon définitive sur la vie économique et sociale préhistorique de Keatley Creek. Toutefois, la présente étude montre l'intérêt d'utiliser ensemble des méthodes d'analyse paléoethnobotaniques et zooarchéologiques dans l'étude de l'organisation de la vie sociale et économique des sociétés préhistoriques.

INTRODUCTION

Differential access and control over resources are fundamental characteristics of complex societies which are reflected in the archaeological record. To examine the archaeological correlates of socioeconomic complexity, we focus on the remains of a large winter village located along the Fraser River in southwestern British Columbia (Figure 1). Ethnographic and archaeological evidence suggests that the hunter-gatherer subgroups occupying these pithouse villages were socially and economically complex (Hayden and Ryder 1991; Hayden and Spafford 1993; Hayden *et al.* 1985). The wide variation in size and apparent complexity of the pithouses led us to develop hypotheses about social and economic differences both among and within pithouses, and to postulate that these differences would be reflected in the organic remains within the houses.

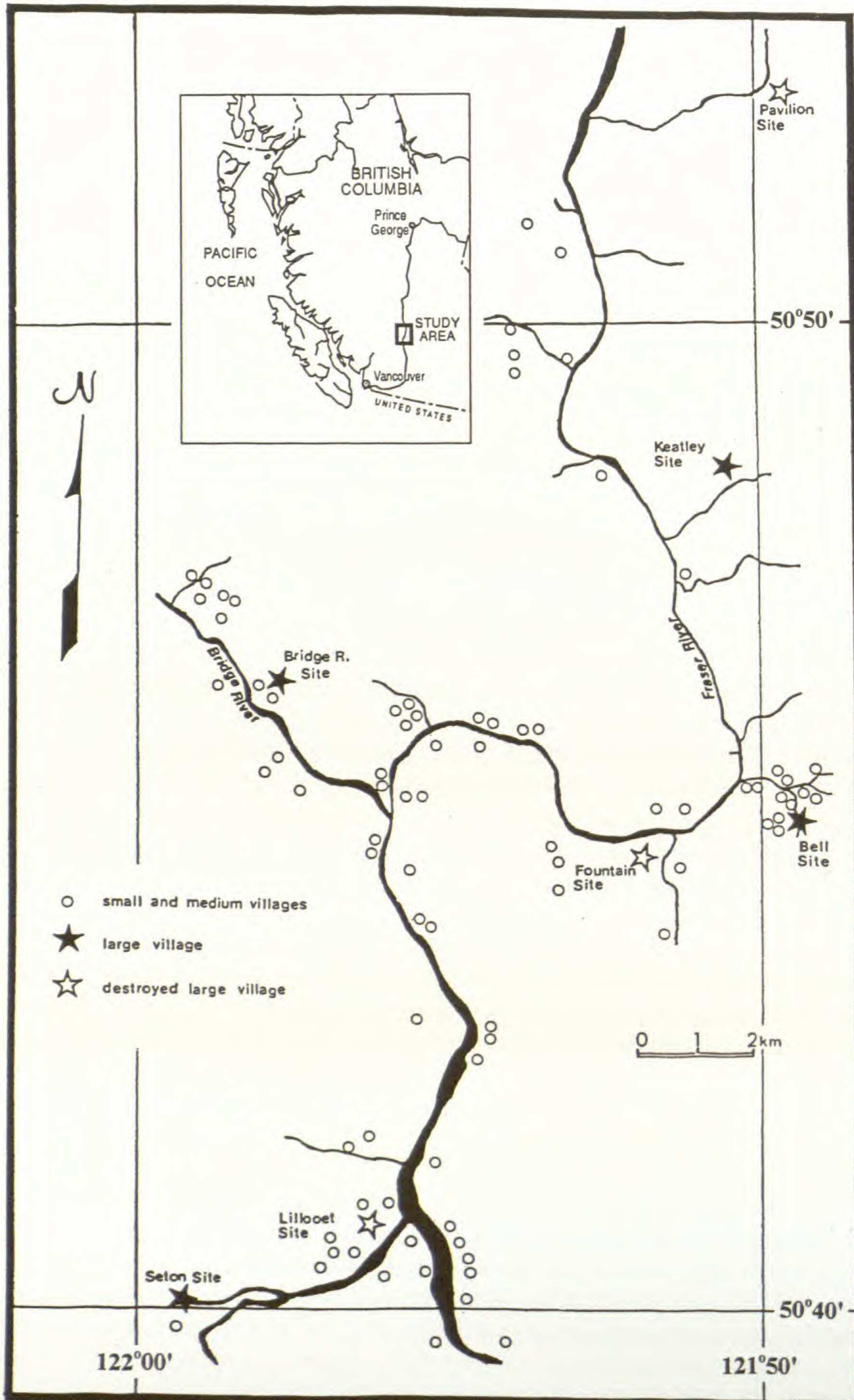
In 1986, an excavation program began at the Keatley Creek site, the largest remaining pithouse village in the region, to reconstruct the prehistoric social and economic organization at the site, and in particular to investigate the position of the vastly different sized residential structures in the socioeconomy. There are a total of 119 house depressions at the site, ranging in size from 5-21 meters in diameter measured from rim crest to rim crest. In order to understand the nature of the different sized structures, a detailed comparison of the economic and social organization of various sized residences was undertaken. In this paper we discuss the socioeconomy of the Keatley Creek site as reflected in species composition, species richness, and spatial distributions of paleoethnobotanical and zooarchaeological remains recovered from the living floors of a small, medium-sized, and large housepit.¹

In developing the overall goal of the project, Hayden *et al.* (1985) hypothesized that the housepit village at Keatley Creek was occupied by residential corporate groups of differing economic and social status. They posited that differences in housepit size were dependent upon socioeconomic differentiation and control. The larger houses, they predicted, housed groups of relatively greater wealth and status, and should exhibit greater internal socioeconomic differentiation than smaller structures.

These hypotheses generate the following predictions:

1) *Differences in residence structure size generally correlate with differences in socioeconomic status, such that the largest houses contained the most privileged individuals, and the proportionally smaller structures the less privileged ones. Assuming that more affluent groups produce more refuse in a greater variety of con-*

FIGURE 1.—Location of Keatley Creek site and other housepit village sites in the study area.



texts, the larger housepits should contain the greatest density and diversity of remains (after sample size has been taken into account), and the greatest number of special or restricted items. The pattern should hold despite the fact that the ethnographies suggest that smaller houses contained a higher density of people than larger structures, and therefore are more likely to produce more remains, all other things being equal (Hayden et al. 1992). The pattern will not apply to special, nonresidence structures, such as feasting or sweat lodges.

2) *The larger residence housepits should exhibit greater internal differentiation than the smaller structures*, indicating the relatively more varied socioeconomy within those structures. The larger, more privileged residential groups will tend to have a wider range of individuals and domestic subgroups with differing wealth, occupation, and status. This would be expressed in two ways: a) by the delineation of the housepit floor space into areas used by distinct domestic subgroups; and b) by differences in status, wealth and/or occupation between these distinct domestic subgroups.

A "domestic subgroup" may be composed of a single nuclear family, an extended family, or several unrelated individuals or families. The delineation of distinct domestic subgroups is distinguished archaeologically by the regular, repeated patterning of food processing and consumption remains across the floor, with each set of remains being associated with a different subgroup. Differences in status, wealth, and/or occupation among domestic subgroups would be expressed by the presence of special or restricted items associated with only some of the distinct domestic subgroups. The absence of regular, repeated patterning of all remains would suggest that internal domestic subgroups were less pronounced and that housepit activities were undertaken more communally.

Initially, 24 housepits were tested to determine their suitability for more extensive excavation and to test these hypotheses. Because of the goals of the project, all large and many small housepits were tested, particularly those in areas less likely to have undergone disturbance by subsequent building events. Almost all of the large and medium-sized housepits tested were first occupied during the Shuswap horizon (3,500–2,400 b.p.), continued to be used during the Plateau horizon (2,400–1,200 b.p.), and were abandoned at the beginning of the Kamloops horizon (1,200–200 b.p.). Refuse inside the house was periodically gathered together and dumped outside at the base of the roof forming stratified rim middens surrounding the house depressions. Houses had to be re-roofed periodically, probably every 1-3 years.² It appears that all the accumulated living floor debris and sediment were removed, and a clean till floor re-established with each re-roofing event. In most houses tested, there was no remaining evidence of multiple house floors. Thus the floor sediments that we excavated represent the accumulated debris of the residents from the last re-roofing event until final abandonment of the house.

We completely excavated the floors of a small (HP 12), medium-sized (HP 3), and large housepit (HP 7). These housepits were chosen because of the ease of defining their floor deposits and because the floor deposits in these housepits were approximately contemporaneous. Clearly defined floor and roof deposits were identified in the selected small, medium-sized, and large housepits on the basis of field criteria such as charcoal remains of roofs, color changes, textural changes, and

artifact orientations. The botanical and faunal material comprising the analyses reported here resulted from these excavations. The specific goals of the analyses were to delineate patterning of remains across the floors of the three houses, and to make comparisons between the structures which could provide insights into socioeconomic differences.

The three housepits are ideally suited for such a study. All three houses were clearly residences rather than special function structures. This is most strongly indicated by the lithic assemblages in all three structures which displays a basic underlying similarity including artifacts likely to have been used by both women (hide scrapers, abrading stones, fire-cracked rocks) and men (projectile points, bifaces; Spafford 1991). The large and medium-sized housepit floors (HPs 7 and 3) yielded radiocarbon dates that were indistinguishable (c. 1100 bp). The smaller housepit appears to have been occupied a few hundred years earlier, but we feel it is representative of the social and economic organization of smaller housepits.³

The persistent association of a *different* type of lithic material with each major housepit from Shuswap times until final abandonment indicates that a single corporate group retained ownership of each large house site over this time period (Hayden 1996). Presumably, each large residential corporate group controlled a separate hunting and gathering area in the mountains and different types of chert were located in these different resource areas. Each corporate group brought back their distinctive chert type to their winter residence. The persistent association of a given lithic type with a particular house implies that the large and medium-sized housepits were continuously occupied over more than 1,000 years by a single, identifiable social group with periodic re-roofing and excavation of prior living floor accumulations. During this time, the larger structures do not appear to have changed fundamentally in size or internal organization based on the relatively close clustering of main post holes and the constant position of storage pits in relation to the edge of the floors.

All houses seem to have been systematically abandoned, with no useful or valuable material being left on the floors. Roofs in all three structures were burned soon after abandonment, thereby sealing the floor deposits from subsequent disturbance and providing a charcoal layer useful in distinguishing the floor from the roof deposits. The burning of all three structures after abandonment resulted in the preservation of a wide variety of floral remains.

The non-random distributions of botanical, faunal, and lithic remains associated with hearths and walls suggest little disturbance or mixing of floor sediments. Further, there is little evidence for contamination or confounding taphonomic factors, such as carnivore damage (Kusmer 1993a; Lepofsky 1993a). The discrete distributions of seeds and fish remains, in particular, are convincing since small remains appear to be those most likely to reflect original primary refuse patterns (Bartram *et al.* 1991; Gifford 1980; Miksicek 1987; O'Connell 1987; Stahl and Zeidler 1990). Nor was there any accumulation of refuse in the center of any of the housepits as one might expect from post abandonment dumping. Moreover, the depositional environment of the three housepits seem to have been similar, suggesting that differences in the preservation of organic remains should be largely due to cultural rather than environmental factors. The Keatley Creek remains, then, are ideal for examining the archaeological correlates of socioeconomic behavior in the

pithouses.

The usable floor of the largest excavated housepit (HP 7), which covered an area approximately 113 m² (not including wall slopes), had a series of well developed fire-reddened areas close to the west perimeter of the floor (Figure 2). These were associated with large storage pits, concentrations of fire-cracked rock, tools, debitage, abrading stones, and anvil stones. The eastern part of the floor had a number of less well defined hearths associated with fire-cracked rock, anvils, tools, debitage, and abrading stones, but no large storage pits, and a narrow earthen bench or shelf along the perimeter. Based on lithic analyses, the fire-reddened areas appear to correspond to individual domestic subgroups within this large house (Spafford 1991). We are interested in determining whether the distribution of organic remains supports this supposition.

The floor plans of the medium-sized and small housepits are less complex than the large structure (Figures 3 and 4). The medium-sized housepit (HP 3) covered approximately 78 m² in area. A wooden bench is suggested by carbonized planks remains recovered along the eastern and northeastern walls. One large storage pit in the northwest floor and three additional more shallow depressions are located on the floor of the medium-sized structure. There are also three fire-reddened areas on this floor. The small housepit (HP 12), which covers only 38 m² in area, had only one fire-reddened area and several shallow depressions.

It is difficult to determine whether floors in the three structures were occupied for the same length of time. However, the debris and discoloration on each of the floors were substantial enough to indicate that all had been used for a number of years. We do not expect any of the floor accumulations to represent more than 60 (and probably far fewer) consecutive years since the last re-roofing event of the structure. The smaller housepit does not appear to have been occupied long enough for a significant amount of debris to have accumulated on the housepit rim. In the other housepits, the rim debris deposits are very thick and begin their depositional sequences prior to 2400 bp.

ENVIRONMENTAL SETTING

The Keatley Creek site is situated about 25 km upstream along the Fraser River from the modern community of Lillooet, British Columbia. The village site is located on a terrace of morainal origin, about 370 m above and 1.5 km distant from the Fraser River. The vegetation on the site today is characteristic of disturbed grasslands in the region and is dominated by various grasses and big sagebrush (*Artemisia tridentata*). Forested slopes rise steeply to the east of the village and, near the site, are dominated by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). These forests extend from the site up to where they grade into sub-alpine meadows. They represent a characteristic elevational sequence of biogeoclimatic zones from the Ponderosa Pine zone, through the Interior Douglas-Fir zone, to a mix of montane and subalpine forest types (Meidinger and Pojar 1991).

The location of the Keatley Creek site on benchlands above the Fraser River gorge allowed access to a variety of animal and plant resources due to the range of biotic zones available within a short distance of the site. Principal food species

FIGURE 2.—Maps showing features and distribution of floral and faunal remains on floor of large housepit (HP 7). Boxes on floral maps indicate 50 x 50 cm sampling subsquares for flotation.

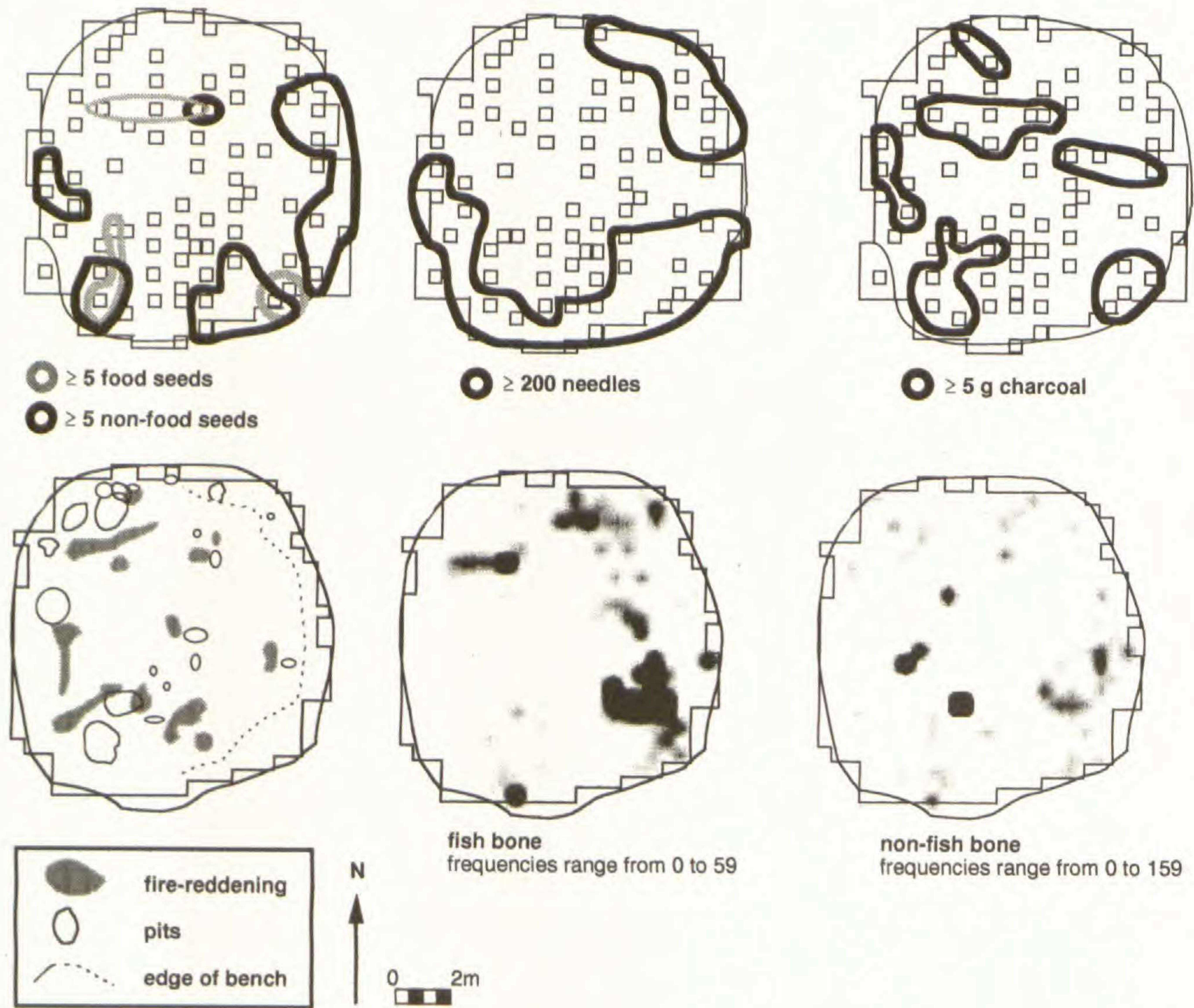


FIGURE 3.—Maps showing features and distribution of floral and faunal remains on floor of medium-sized housepit (HP 3). Boxes on floral maps indicate 50 x 50 cm sampling subsquares for flotation.

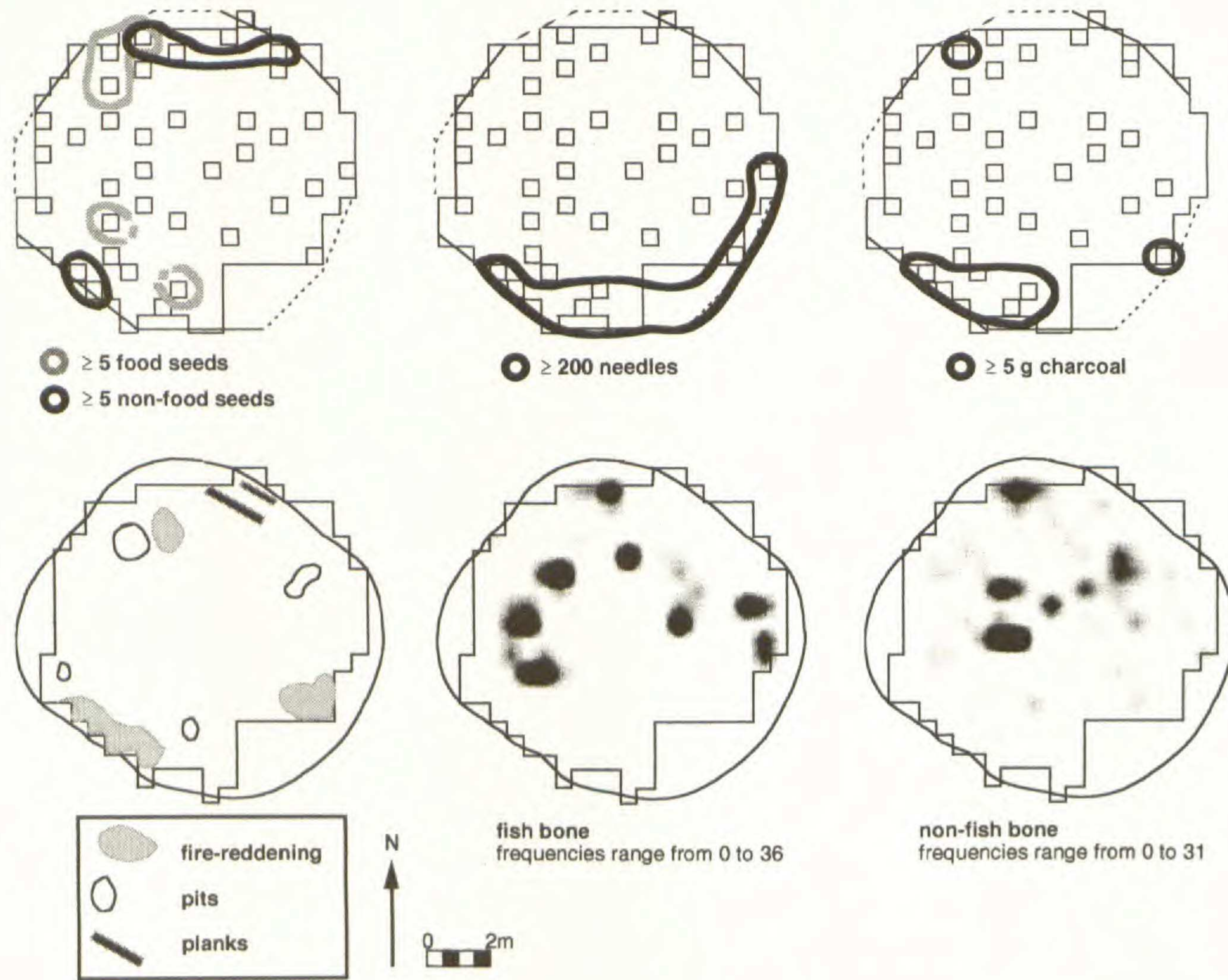
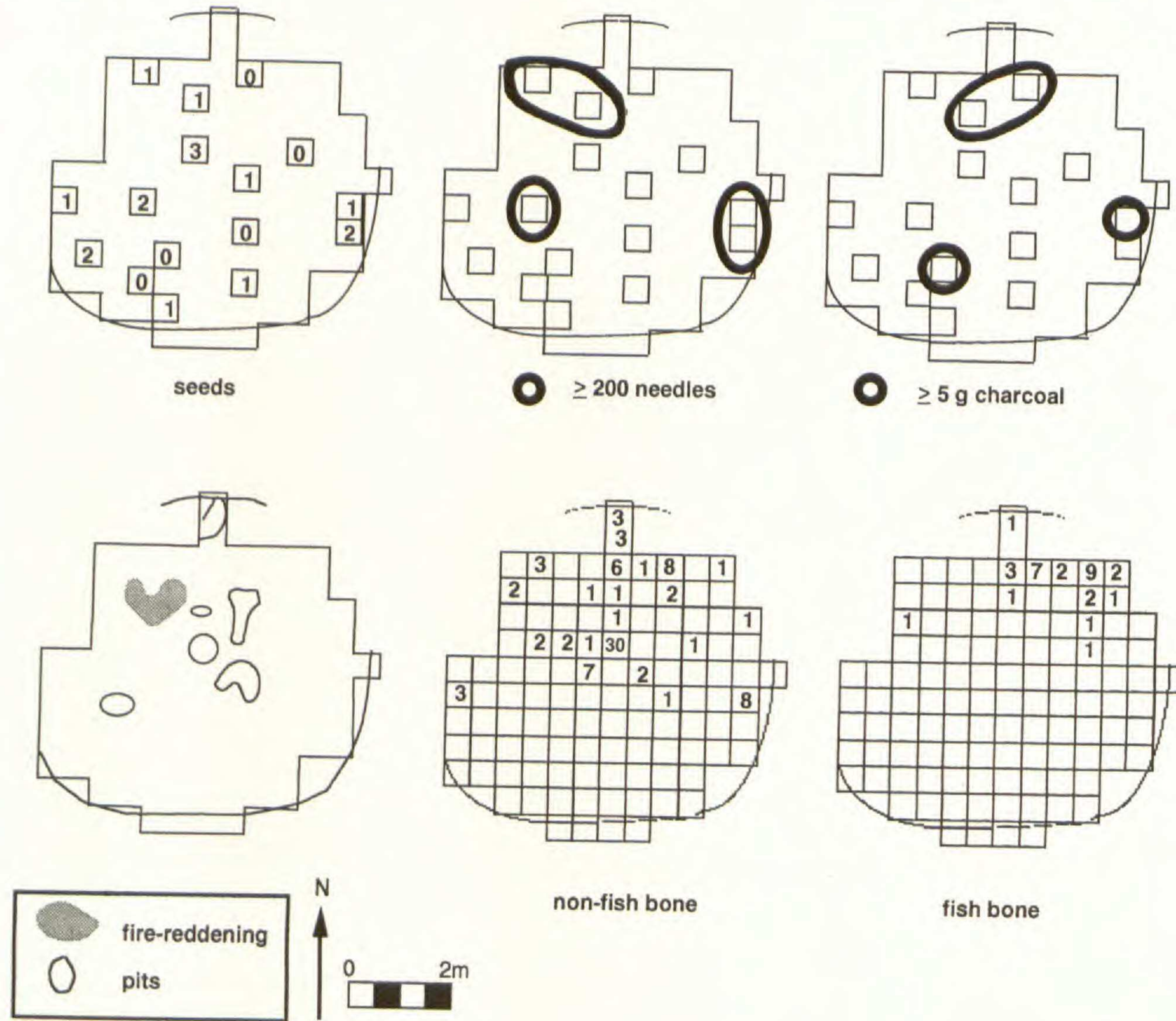


FIGURE 4.—Maps showing features and distribution of floral and faunal remains on floor of small housepit (HP 12). Boxes indicate 50 x 50 cm sampling subsquares. Numbers in the subsquares are the total numbers of seeds or bones recovered from each subsquare.



include anadromous salmon (*Oncorhynchus* spp.), deer (*Odocoileus* spp.), bighorn sheep (*Ovis canadensis*), a variety of berry crops such as rosehips (*Rosa* spp.), currants (*Ribes* spp.) and saskatoons (*Amelanchier alnifolia*), and several edible "roots" including balsamroot (*Balsamorhiza sagittata*), various members of the lily family, and several *Lomatium* species. See Alexander (1992) for a more detailed discussion of fauna available in the various vegetation zones around the site and Turner (1992) for a detailed ethnobotanical discussion of plant use by the St'at'imc (Upper Lillooet) of the Keatley Creek area.

METHODS

Excavators collected bulk flotation samples for the paleoethnobotanical analysis from designated 50 x 50 cm sampling subsquares (Figures 2-4). All samples were measured to a standardized volume of one liter and then floated using the "garbage can" technique (Watson 1976). The bucket mesh was 1.0 mm and the scoop mesh was 0.45mm. The light fraction provided the material for the paleoethnobotanical analysis (Lepofsky 1993a, 1993b) and the heavy fraction the material for the microfaunal and microdebitage analyses (Handley 1990; Kusmer 1993a, 1993b). The heavy fraction was also checked for charred botanical remains.

A total of 123 flotation samples from pithouse floor contexts was examined for archaeobotanical remains, which was comprised of 69 samples from the large housepit (HP 7), 38 from the medium-sized housepit (HP 3), and 16 from the small structure (HP 12). In the large and medium-sized housepits roughly 15% of the floor subsquares were examined for archaeobotanical remains; approximately 12% of the floor subsquares of the small housepit were examined.

Faunal remains were recovered from 6.35 mm mesh dry screening of the excavated floor deposits and from the heavy fraction of flotation samples, which allowed recovery of bones down to 1 mm in size. All the faunal remains recovered from the 6.35 mm screens from the three housepit floor deposits were examined. In the large and medium-sized housepits faunal remains from flotation samples were examined from ca. 25% of the floor subsquares, while ca. 16% of the remains from the small housepit were examined. Faunal remains from the examined flotation samples consist of salmon fragments and tiny, unidentifiable mammal fragments. These data largely proved to be redundant with data from the larger mesh screens; the few exceptions are discussed below. Our analyses and discussion of relative frequencies of taxa, taxonomic richness, and evenness are based on data from the 6.35 mm screens.

RESULTS

The results of the paleoethnobotanical and zooarchaeological analyses for the large, medium-sized, and small housepits are discussed in turn below, followed by comparisons of remains among the three structures. The frequency and distribution of archaeobotanical and zooarchaeological remains across the floors of the housepits are represented in Figures 2-4. High concentrations of archaeobotanical and zooarchaeological remains are distinguished on the maps. Lists of the plant

and animal taxa recovered, their frequencies, and uses are presented in Tables 1 and 2.

TABLE 1.—Archaeobotanical remains recovered from the floor of the three housepits.*

Scientific Name (common name)	Part found [†]	Frequency			Primary Use [‡]
		Large HP (HP 7)	Medium HP (HP 3)	Small HP (HP 12)	
<i>Alnus</i> cf. <i>sinuata</i> (alder)	C	5			T
<i>Amelanchier alnifolia</i> (saskatoon)	S	40	27	2	F
<i>Arctostaphylos uva-ursi</i> (kinnikinnik)	S	9	11		F
<i>Betula papyrifera</i> (paper birch)	C	1			T
?Boraginaceae (Borage Family)	S	1			?
<i>Carex</i> sp. (sedge)	S		1		T
<i>Chenopodium</i> sp. (chenopod)**	S	148	36	10	?
<i>Cornus sericea</i> (red-osier dogwood)	S	3			F
Ericaceae (Heather Family)	S	62	44	2	?F
Graminae (grass) **	S	77	9		T
—	O	79	115		T
<i>Opuntia</i> sp. (prickly pear)	S	2	12		F
<i>Phacelia</i> sp. (phacelia)	S	20	7		O
<i>Pinus ponderosa</i> (ponderosa pine)	N	10078	7521		T
—	C	67	25		T
<i>Populus</i> sp. (cottonwood)	C	44	20		T
<i>Prunus</i> sp. (cherry)	S	4			F
<i>Pseudotsuga menziesii</i> (Douglas-fir)	N	18129	835		T
—	C	218	88		T
—	S		5		?
<i>Rosa</i> cf. <i>woodsii</i> (rose)	S	9	1		F
<i>Scirpus</i> sp. (rush)S	1			T	
<i>Silene</i> sp.	S		1		O
<i>Smilacina stellata</i> (Solomon's seal)	2			F	
Unidentified	C	14	7		—
Unidentified	S	94	16	2	—
Total N⁺⁺	C	349	140	—	—
Total N	S	472	172	16	—

*Miscellaneous plant parts, such as buds, bark, and other plant tissues are not included here. See Lepofsky (1993a) for complete presentation of data.

†C = charcoal; S = seed; N = needle; O = other

‡F = Food; T = technology; O = other; see Lepofsky (1993a) for more detailed ethnobotanical descriptions.

**There is no ethnobotanical or paleoethnobotanical evidence that either chenopods or grass seeds were ever eaten in the Interior Plateau.

†† Charcoal from only a small number of the total flotation samples were identified. No charcoal specimens from HP 12 were identified.

TABLE 2.—Faunal remains recovered from the three housepits floors.

Scientific Name (common name)	Frequency			Primary Use‡
	Large HP (HP 7)	Medium HP (HP 3)	Small HP (HP 12)	
Uniden. freshwater shellfish	5	2		T
<i>Dentalium</i> sp. (dentalium)	3			T
<i>Hinnites giganteus</i> (purple-hinged rock scallop)	1			T
<i>Margaritifera falcata</i> (freshwater shellfish)	2	-		T
<i>Nucella</i> sp. (dogwinkle)	1			T
<i>Oncorhynchus</i> sp. (salmon)	1344	314	31	F
<i>Accipiter</i> sp. (hawk)	2			T
Tetraoninae (grouse)	4			F
Bird	1			
<i>Lepus americanus</i> (snowshoe hare)	19			F,T
<i>Castor canadensis</i> (beaver)	16	4	3	F,T
<i>Peromyscus</i> sp. (deer mouse)	1			
<i>Microtus</i> sp. (vole)	9			
<i>Canis familiaris</i> (domestic dog)	1	41 (MNI = 1)		
<i>Vulpes vulpes</i> (red fox)	1			T
<i>Ursus arctos</i> (grizzly)	1			T
Artiodactyl	27	12	3	F,T
<i>Cervus elaphus</i> (elk)			2	F,T
<i>Odocoileus</i> sp. (deer)	42	5	1	F,T
<i>Ovis canadensis</i> (bighorn sheep)	1			F,T
Unidentified large mammal	176	35	10	
Unidentified mammal	751	147	71	
Total NISP	2407	561	121	

‡ F = Food; T = Technology; see Kusmer 1993a for more detailed accounts of taxa.

The paleoethnobotanical remains were divided into the three major plant categories recovered on the floor: charcoal, needles, and seeds. Seeds were divided further in the large (HP 7) and medium-sized (HP 3) structures into food seeds, non-food seeds, and unidentified seeds (see Table 1 and Lepofsky 1993a for ethnobotanical descriptions). The category "unidentified seeds" is largely composed of single specimens of each unidentified taxon. In each of the housepits, floral remains were quantified by determining the number of specimens per one liter flotation sample collected from each sampling subsquare. These numbers were used to determine the concentrations of remains on the floors.

Distinguishing archaeobotanical patterning across the floor of the small

housepit is somewhat more problematic than in the two larger housepits. Because the small housepit has such limited floor space, clusters of remains may be more spatially restricted than in the other housepits. Thus, although roughly the same percent of surface area in the three structures has been analyzed for archaeobotanical remains, we may be missing relatively more information in the unsampled subsquares of the small structure. Given the nature of the paleoethnobotanical sampling strategy in the small housepit, any concentration of remains is likely to be defined by very few subsquares.

The zooarchaeological analysis was divided into fish and non-fish (mammal, bird, and shellfish) remains. Within the mammal category, it is difficult to interpret activities with respect to artiodactyls because of the nature of the bone fragments. The high degree of bone fragmentation and loss due to marrow extraction, burning, tool making, the clearing of the floor of large debris, and trampling, resulted in few identifiable fragments. Because of the low numbers, it is difficult to compare identifiable elements on a hearth to hearth basis, but it is useful to compare frequencies of unidentifiable bones. The identifiable fragments reflect most clearly their resistance to the above processes and their relative identifiability as small fragments. The rather extensive bone and antler tool industry reflected in the bone artifacts would also have affected the presence/absence of specific elements of artiodactyls.

The large housepit.—Archaeobotany. Charcoal, needles, and seeds are distributed non-randomly on the floor of the large housepit (Figure 2). Relatively denser concentrations of charcoal fragments are located in six discrete clusters on the floor of the large structure. The charcoal clusters correspond well with the hearths on the western perimeter of the floor. On the eastern side, charcoal concentrations and the less well defined fire-reddened areas do not correspond. This may be due to the fact that the eastern hearths were not used frequently enough to have accumulated or retained large amounts of charcoal debris. Conversely, the presence of charcoal and no hearths may be contamination from the burnt roof.

Conifer needles in the large housepit are clustered along much of the periphery of the floor, and are almost entirely absent from the center of the structure. The concentration of conifer needles around the periphery of the floor likely indicates the deliberate covering of the floor and sleeping platform with boughs for bedding or floor covering, as was documented in ethnographic times (Teit 1900:199). This in turn implies that there were sleeping or domestic areas behind the hearths around most or all of the house perimeter.

There are three discrete concentrations of food seeds across the large housepit floor, all of which correspond closely to charcoal concentrations. The area in and around the hearth in the north-central area is the largest cluster. If the unidentified seeds are included (each representing a single taxon; see fn. 8), this area of the floor also contains the greatest diversity of taxa. The extent and diversity of seeds in and around this hearth suggests that the hearth was repeatedly used for plant processing, or (less likely) was the regular discard area for all plant foods used in the pithouse. This hearth area is therefore a good candidate for a special activity area.

The other two clusters are considerably smaller in extent and diversity of seeds

than the large concentration. Their limited occurrence suggests that they were either more minor plant processing areas, or accidental, or unique events. The analysis of additional subsquares in the large housepit adjacent to these smaller food seed clusters would help to better define their nature. Plant processing which did not involve fire (and the accidental charring of plants) may have occurred elsewhere on the floor, but the residues from these events are not likely to show up in the archaeobotanical record.

Non-food seeds occur in clusters in five discrete areas on the floor of the large housepit. Although we have separated the concentrations on the periphery of the floor into four discrete clusters, we suspect that the gaps between the clusters have more to do with gaps in our sampling than actual breaks in the distribution. The concentration of non-food seeds along the south and east periphery of the pithouse corresponds well with the zone of highest needle concentration. The non-food seed category is predominantly composed of charred chenopod and grass seeds. The grass and needles are likely the remains of a covering for bedding or floor covering composed of grass stems and conifer boughs. Why the charred chenopods are also associated is not clear, but they may have been accidentally collected along with the grasses. A pollen study (Vance n.d. in Lepofsky 1993a) indicates that chenopods were a major component of the local prehistoric flora at Keatley Creek.

Zooarchaeology. Approximately 2400 bones were recovered from floor deposits of the large housepit (Figure 2). About 60% of these are fish bones, about 5% are identifiable mammal bones (primarily artiodactyl/deer), and about 35% are small, unidentifiable mammal bone fragments (probably mostly deer).⁴ The distribution of different size categories of bones, with larger bones occurring primarily towards the periphery of the floor, suggests that housecleaning activities kept the activity areas clear of large debris. Burned bone fragments are scattered in low amounts over the floor, with concentrations associated with hearths and fire-reddened areas. The percentage of burned mammal bones is higher in the west and south (73%) than in the east (44%), suggesting differential use of fire and mammal bone processing or consumption practices between the west and east.

Four areas on the floor contain high frequencies of fish, along with less distinct concentrations of mammal bone (primarily artiodactyl). These fish concentrations are also well represented in the flotation samples. The only difference is a cluster of fish bones along the wall in the southwest which shows up in the flotation sample, but not the larger bone sample. This area also had many tiny, unidentifiable fragments and may have been an area of heavy trampling or extreme bone reduction.

Fish bone concentrations in the northwest, southeast, and south/southwest are associated with hearths and storage pits. In the south/southwest there is also a concentration of mammal remains. In the northwest, in addition to the fish and artiodactyl, are the remains of grizzly bear, red fox, and bighorn sheep, found only in this area. Also, the large pits in this area contain unusual remains such as a dog burial, hawk wing bones, and trade shells (dentalium and dogwinkle).

In the southeast, the artiodactyl concentration is relatively high, as is the fish

density. Hare and grouse are limited to this area of the floor. The presence of more types of artiodactyl skeletal elements here than on the rest of the floor suggests this may have been an important area for reduction of large artiodactyl parts prior to cooking. The relatively high frequency of small bone fragments here compared to other areas of the floor further suggests processing for marrow and grease extraction in this area.

Scattered fish are present in the northeast and artiodactyl bones here are near a small hearth. An abundance of beaver incisors also in the northeast may indicate a locus for woodworking.

Each of these four areas, in the northwest, northeast, southeast, and south/southwest, likely represents a discrete activity area for animal consumption and/or processing. This repeated patterning of remains also suggests the presence of independent domestic subgroups within this structure. Based on the presence of rare faunal remains and major storage pits and hearths, the group occupying the northwest may have held relatively higher status.

The medium-sized housepit.—Archaeobotany. Charcoal, needles, and seeds are distributed non-randomly across the floor of the medium-sized housepit (Figure 3). There are three distinct charcoal concentrations on the floor of the medium-sized housepit. There is generally a close relationship between fire-reddened areas and charcoal frequencies. The concentration of needles along the southern periphery of the floor likely distinguished this area for sleeping or sitting, as in the largest structure. As in the large house, this implies the use of most or all of the periphery of the house as domestic or sleeping areas.

There are three concentrations of food seeds on the floor of the medium-sized housepit: one large and two smaller clusters. Each of the three clusters is associated with charcoal concentrations and nearby fire-reddened areas and likely functioned for food plant processing. The extent and number of plant remains in the large concentration in the northwest of the floor suggests that this area was used repeatedly for plant processing. The two small concentrations may represent single events.

As in the large housepit, the non-food seed clusters on the floor of the medium-sized housepit are located along the periphery of the structure. In each case, the bulk of the non-food seeds are comprised of charred chenopods. This differs from the large housepit where the category was comprised primarily of chenopod and grass seeds. Without the presence of grass seeds, we cannot think of a parsimonious cultural explanation for the chenopods along the periphery of the floor of the medium-sized housepit. We cannot rule out the possibility that the distribution of charred chenopods along the periphery of the structure may be due to post-occupation depositional processes, but this does not account for their concentration only around the peripheral areas under the deepest accumulations of collapsed roof deposits (Lepofsky 1993a). There is no recorded evidence that chenopods were eaten ethnographically, and their absence from hearth areas makes it unlikely that they were used as food prehistorically.

Zooarchaeology. Approximately 560 bones were recovered from floor deposits in the medium-sized housepit. Fifty-six percent of these are fish bones, 32% are

unidentifiable mammal, and 12% are identifiable mammal (Figure 3). As in the large housepit, most of the remains on the floor are small, suggesting the inhabitants of the medium-sized structure were keeping the activity areas clear of larger debris. The largest bones occur most often near the periphery, except for an immature, largely articulated post-cranial canid skeleton found on the floor in the west-center area.

Fish bones occur around the perimeter of the floor, except for the southeast. Articulated salmon remains occur near the walls in the east and in the north, suggesting these were areas of little trampling, perhaps under benches. This distribution is similar to the fish distribution from the flotation samples, except that more fish were recovered from the flotation samples in the northeast. The presence of tiny fish fragments here may be due to heavy trampling. Fish concentrations in the north and in the southwest are associated with fire-reddened areas.

The two largest non-fish concentrations near the west/center are portions of the immature canid skeleton. Other non-fish bones (primarily artiodactyl) are found in the highest frequencies in the north and east/center of the floor, with lightly scattered remains across much of the floor. The concentration of artiodactyl (and fish) in the east is associated with a small storage pit and fire-cracked rock and may be a food processing area. The concentration of bones in the north is associated with a storage pit and fire-reddened areas and may also represent a food processing area. However, a number of bones in this area, including artiodactyl bones, are larger than other floor bones. Their size and location against the house wall suggests these bones may represent debris from housecleaning activities placed in a "provisional discard" location (Hayden and Cannon 1983). Surprisingly, there are few faunal remains near the large hearth in the southeast.

The patterning of faunal remains across the floor of the medium-sized house is more indicative of communal food preparation, rather than of distinct social subgroups performing the same animal food-related activities. The fish concentrations associated with fire reddened areas may represent two discrete fish consumption/processing areas in the north and southwest.

The small housepit.—Archaeobotany. Concentrations of charcoal and needles, but not seeds, can be distinguished on the floor of the small housepit (Figure 4). The three charcoal concentrations roughly correspond to the concentrations of needles. The charcoal and needle concentrations in the north correspond to the fire-reddened area.

Seed densities are strikingly low in all areas across the floor of the small housepit, and no area appears to have a greater or lesser concentration than another. Even the areas which have a concentration of both charcoal and needles, have almost no seeds. Indeed, only 16 seeds were found across the floor, representing only 5 taxa. The most ubiquitous seed remains are chenopods, which are of uncertain ethnobotanical significance, and even its total number is low.

Zooarchaeology. About 120 bones were recovered from floor deposits in the small housepit (Figure 4). Twenty-six percent of the floor bones are fish and these are clustered in the northeast corner of the floor. The majority of the remaining floor bones are small, unidentifiable fragments. They are found primarily in the

north half of the floor near a fire-reddened area. The presence of a single concentration of faunal remains on the floor, corresponding to a hearth and fire-cracked rock concentration, suggests animal food processing activities took place communally in this small house.

Comparisons between housepits.—Archaeobotany. A common pattern displayed in all three structures is the relative absence of all three categories of archaeobotanical remains in the center of the floors. This pattern, however, is less marked in the small housepit than in the medium-sized and large housepits, probably owing to greater constraints on the use of space. Since charcoal can be easily displaced and is difficult to remove, it seems clear that considerable care was taken to keep housepit centers clear of debris. The center may have been a communal use area for the inhabitants of each structure.⁵

TABLE 3. Abundance of charcoal, needles, and seeds recovered from the three housepit floors.*

	Large HP (HP 7)	Medium HP (HP 3)	Small HP (HP 12)
<u>Charcoal</u>			
total (g)	4.4 ± 3.9	2.8 ± 2.0	2.9 ± 2.8
Douglas-fir (N)	62.5 ± 20.3	62.5 ± 21.6	—
Ponderosa pine (N)	18.0 ± 13.7	19.3 ± 20.6	—
<i>Populus</i> (N)	14.5 ± 19.7	14.7 ± 7.1	—
<u>Needles</u>			
total (N)	444.7 ± 971.8	235.5 ± 463.2	278.1 ± 536.6
<u>Seeds</u>			
total (N)	6.8 ± 9.2	4.7 ± 5.0	1.0 ± 0.9

* Means and standard deviations, calculated per 1 liter flotation sample.*

The average amounts of charcoal recovered per liter flotation sample can be compared for the three housepit floors (Table 3). Charcoal abundances on the three floors are statistically different from one another (ANOVA, $p = 0.04$), but in a post hoc 2-way comparison only the large and the medium-sized floor charcoal are significantly different (Tukey HSD, $p = 0.07$).⁶ Thus, the large structure has significantly more charcoal on the floor than the medium-sized structure, but not more than the small structure. From this, we can conclude that on average more fires may have been burned in the large than medium-sized structure, but there was no difference in fire intensity in the large structure versus the small one, nor in the medium-sized housepit versus the small housepit.⁷

In terms of species, on average, the three most common wood species (Douglas-fir, pine, *Populus*) are found in almost exactly the same proportions on the floor of the large and medium-sized housepits (Table 3; D-fir: Mann Whitney U test, $p = 0.92$; Pine: Mann Whitney U test, $p = 0.80$; Pop: Mann Whitney U test, $p = 0.16$). In fact, these taxa have almost identical abundances and standard deviations across the two housepit floors. Identifications of charcoal from the small housepit were not carried out.

We can conclude from this that the same kinds of fuel wood were generally burned in the large and medium-sized structures, but that more fires were burned on average in the largest structure than the medium-sized structure. This result is supported by a greater degree of fire-reddening underlying the hearths of the large structure compared to the medium-sized structure. Whether the burning of more fires has more to do with differential access to fuel, the intensity which the large housepit as a whole was used, or perhaps length of use of the last floor, cannot be determined at present.

Although the three structures do not differ from one another in average needle abundance per liter flotation sample (ANOVA, $p = 0.2$), the distributions of needles on the three floors are quite distinct. The nearly continuous peripheral concentrations in the large and medium-sized structures but not the small housepit indicate that the needles may have been used differently in the latter structure. The concentration of conifer needles around the periphery of the larger two housepit floors likely indicates the deliberate covering of pole or plank platforms with boughs for bedding or floor covering. While these platforms are described and illustrated ethnographically, they are more difficult to identify archaeologically. Only the presence of small post holes near the wall of the large house, an earthen bench along the wall of the same structure, and a fortuitously preserved bench plank along one wall of the medium-sized house, indicate use of sleeping platforms at Keatley Creek. The inhabitants of the small housepit slept either directly on the pithouse floor or on mats that were not preserved. The source of the sporadic high concentrations of needles on the floor of the small housepit cannot be determined at this point.

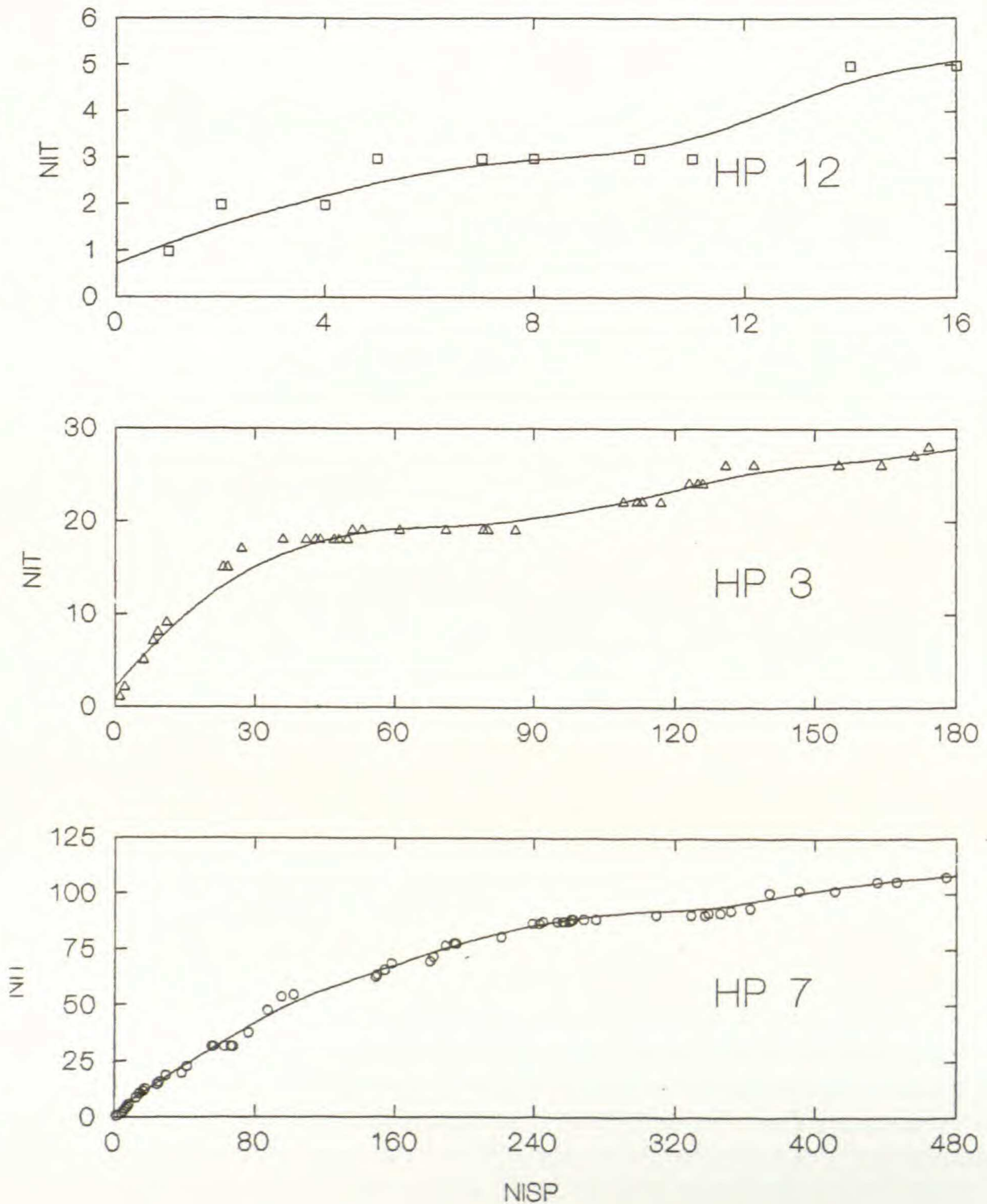
The three housepits differ from one another in the average number of seeds recovered per liter flotation sample (Table 3; ANOVA, $p = 0.005$). In a post hoc 2-way comparison the large structure is significantly different from the small housepit (Tukey HSD, $p = 0.003$), and the medium-sized housepit significantly differs from the small structure (Tukey HSD, $p = 0.04$). If seed density can be taken to represent intensity of use, these results suggest more intensive use of seed plants in the large and medium-sized housepits than in the small. The medium-sized and large housepits cannot be distinguished statistically.

Differences in species richness in the housepits can be evaluated by comparing the number of seed taxa on the floors of the three structures. Richness is the number of species present in a given assemblage. Although we were only able to identify a limited number of taxa, far more taxa are represented by the unidentified category. When number of taxa represented in the unidentified category are taken into account, it is clear that the floor of the large housepit has far more *taxa* represented by seeds than either of the other two housepits (Table 1; HP 7 = 108, HP 3 = 28, HP 12 = 5).⁸

In order to assess these differences in richness, we need to consider the effect of sample size. When the logarithm of the total number of seed is plotted against the logarithm of the number of specimens (not shown) in the three housepits, the three structures fall on the same line, indicating that total number of taxa can be accounted for by sample size. However, a plot of the number of taxa against number of specimens recovered (Figure 5) illustrates that the slope is beginning to

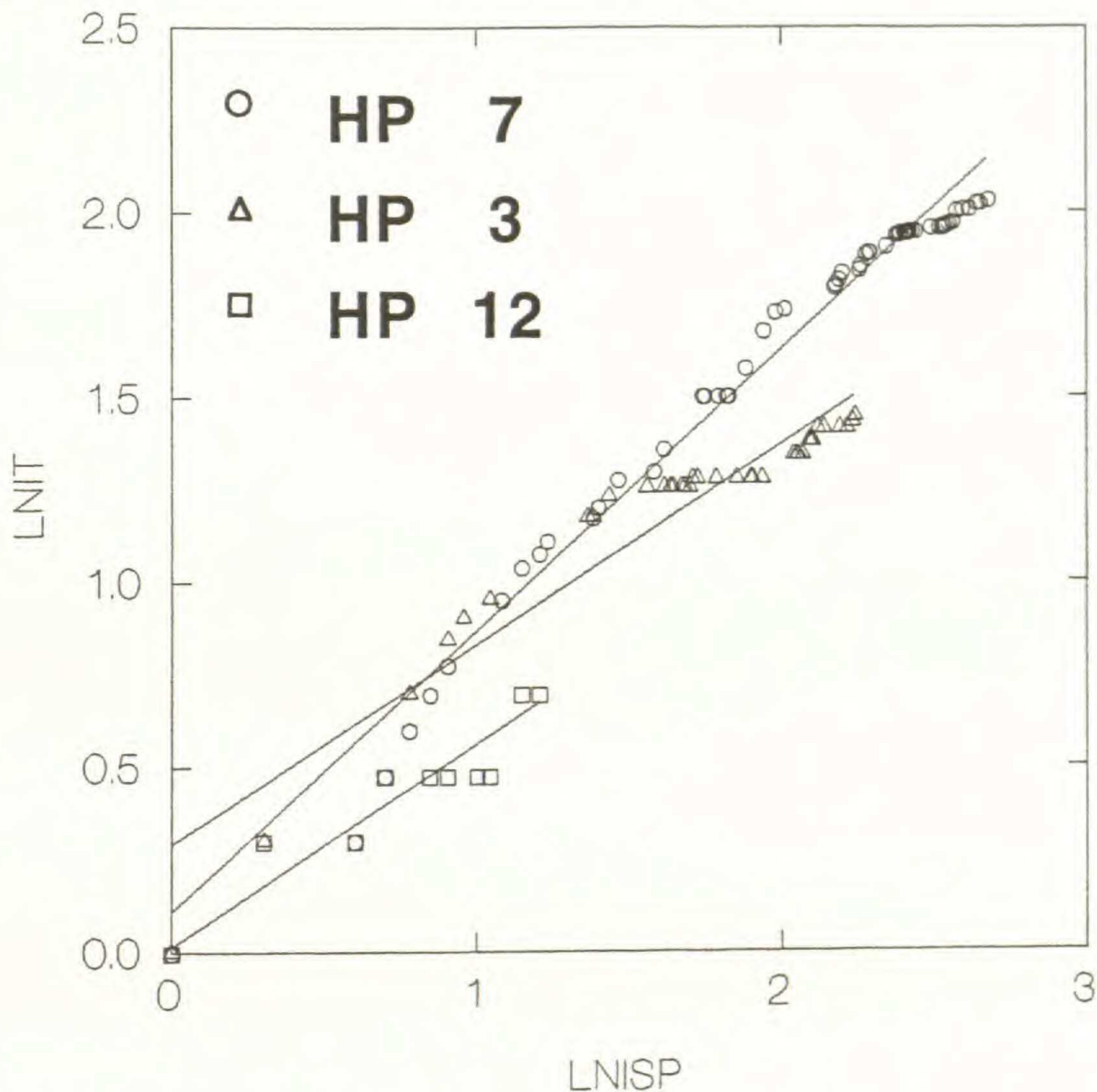
level off in the two larger structures and that the number of taxa is approaching the true maximum number of taxa. From this we can conclude that these housepits have been adequately sampled to assess relative richness, and that the differences in species richness may represent real behavioral differences between the structures.

FIGURE 5.—Number of identifiable taxa (NIT) of seeds plotted against number of identifiable specimens (NISP) recovered from three housepit floors. The lines are distance weighted least squares smoothings (DWLS; Wilkinson *et al.* 1992).



Although we have no basis to argue that the number of taxa represented in the small structure approaches its true maximum number of species, there appear to be real differences in taxon abundance in the three structures. The larger structures have already accumulated more taxa than the small house when we compare them at the point they have each accumulated a number of identifiable specimens equal to the total accumulated in the small structure (i.e., at NISP = 16, HP 7 = 12 taxa, HP 3 = 13 taxa [interpolated], HP 12 = 5 taxa). This indicates that the patterns observed in the small house are not merely an artifact of sample size.

FIGURE 6.—Log number of identifiable taxa (LNIT) of seeds plotted against log number of identifiable specimens (LNISP) recovered from three housepit floors, illustrating accumulation rates of seed taxa per specimens.



To further examine the differences in species diversity, we compare the rate of accumulation of species relative to the addition of new specimens (Figure 6). In biological samples, the number of species observed characteristically increases with the size of the sample, the area sampled, or the number of specimens examined (Krebs 1989; Magurran 1988). The rate at which species accumulate with sample size, as well as the eventual asymptote of species richness, can both be used to characterize an ecological community. We take the logarithm of the number of seed taxa and of the number of seed specimens and fit regression lines to charac-

terize their relationship within each housepit. When the slopes of the three lines are compared, the large housepit is significantly different than the medium-sized and small housepits (ANOVA f-test for homogeneity of slope; $p < 0.0001$ in both cases), but the medium-sized and small housepits are statistically similar ($p = 0.89$). From this we can conclude that the large housepit is accumulating number of species/specimens at a significantly higher rate than in the other two housepits.

Finally, we compare the three housepits in terms of species evenness. Evenness is a measure of the equability of the relative abundances of the species in an assemblage. For example, an assemblage with low evenness would be dominated by many individuals of a few taxa, with other taxa poorly represented. The small housepit appears to have the least even distribution of species (Figure 7) and the medium-sized and large structures appear similar in evenness. However, the shapes of the frequency distributions in Figure 7 cannot be distinguished statistically (Kolmogorov-Smirnov test, HP 7 and 3: $p = 0.70$; HP 7 and 12: $p = 0.37$; HP 3 and 12: $p = 0.43$).

There are some notable differences in the seed species composition of each of the houses, especially among the less common species. The three most abundant species in the medium-sized and large structures (not including the unidentifieds) make up approximately 65% and 60%, respectively, of the entire distribution. In the case of the large housepit, the total includes chenopods, grasses, and Ericaceae. In the medium-sized structure the three most common taxa are Ericaceae, chenopods, and saskatoons. Of the seven most rare species in each distribution, only two are shared between the two structures. This may be a result of sample size or may represent actual differences in species use in the two housepits. Chenopods dominate the small housepit assemblage.

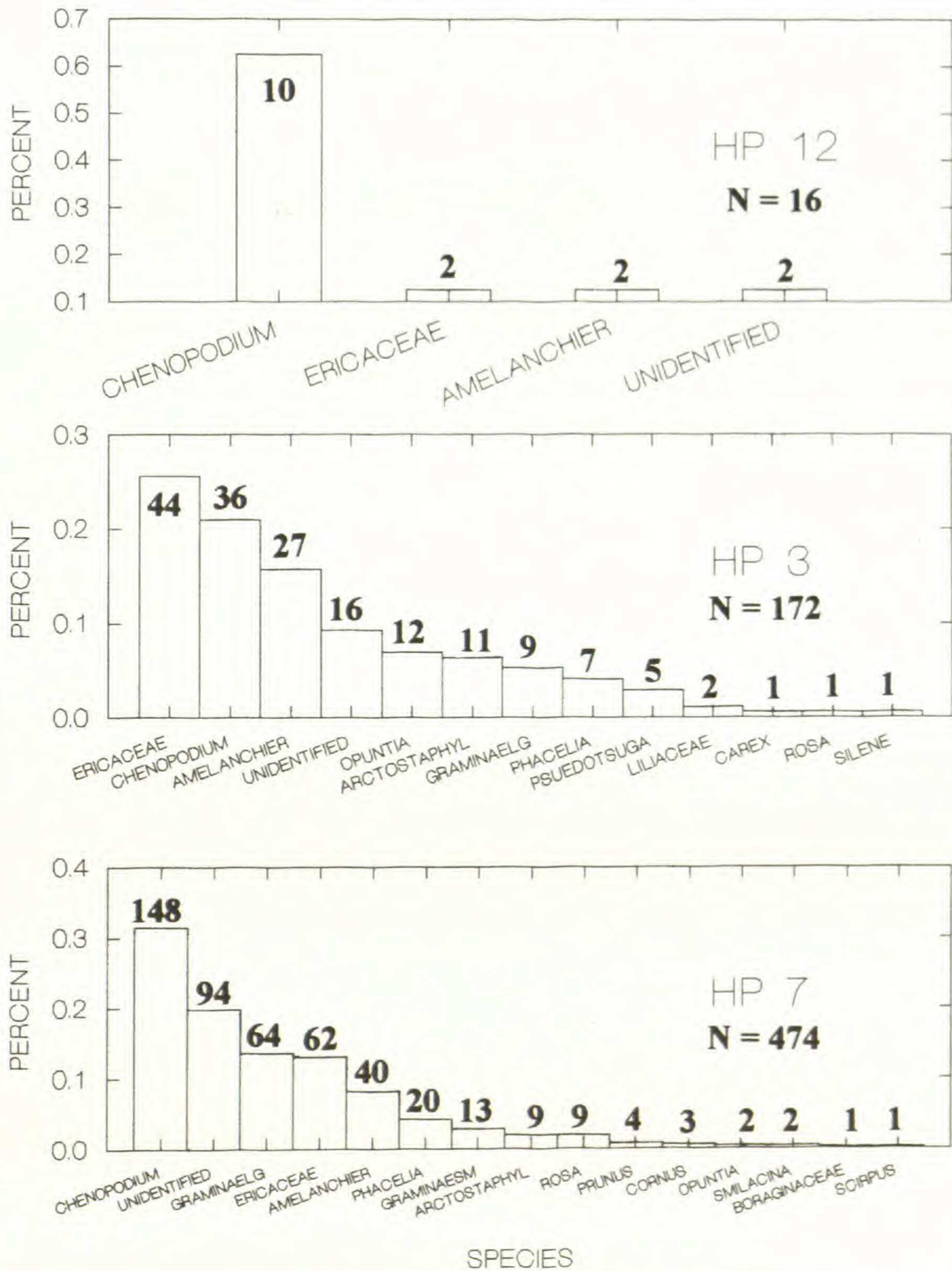
TABLE 4. Relative frequencies of select faunal taxa from the three housepit floors.

	Large HP (HP 7)	Medium HP (HP 3)	Small HP (HP 12)
Total (N)	2,401	561	121
Fish	.56	.56	.26
Canid	<.01	<.01	.00
Artiodactyl*	.03	.03	.05
Large mammal	.07	.06	.06
Other	.33	.34	.63

* "Artiodactyl" includes deer, sheep, elk, and unidentified artiodactyl remains.*

Zooarchaeology. The relative frequencies of important taxa from the three housepits are listed in Table 4. The large (HP 7) and medium-sized (HP 3) housepits contain similar proportions of fish, canids, artiodactyls, and large mammal bones on the floor, while the small housepit contains less fish. In terms of average abundance per square meter of floor, the three housepits are significantly different in total number of bones, number of fish bones, and number of mammal bones

FIGURE 7.—Abundance of seed taxa recovered from three housepit floors.



(ANOVA, $p < 0.0001$ in all cases; Table 5). However, in post-hoc 2-way comparisons the only significant differences are between the large housepit and the other two (Tukey HSD, $p < 0.01$). The large housepit has significantly greater density of animal remains than the medium and small structures, but the medium and small structures do not differ in terms of average density of remains.

TABLE 5. Abundance of selected faunal taxa on the three housepit floors.*

	Large HP (HP 7)	Medium HP (HP 3)	Small HP (HP 12)
Fish	12.1 ± 23.2	4.9 ± 10.0	1.1 ± 3.1
Mammal	9.5 ± 16.4	3.6 ± 8.5	3.1 ± 6.1
Total bones	21.6 ± 28.3	8.5 ± 15.8	4.1 ± 7.2

Means and standard deviations, calculated per square meter of floor. Numbers are based on numbers of identified specimens.

Differences in the species of salmon present between the large housepit and the medium and small housepits imply differential access to salmon resources (Berry 1992). All of the fish in the small housepit and over 90% in the medium-sized housepit were found to be pink salmon (*Oncorhynchus gorbuscha*), while in the large housepit, a broader range of age-categories of salmon, including mostly pink salmon, but also three year-old salmon and a few four and five year-olds were present. The three year-olds probably represent sockeye salmon (*O. nerka*), although the possibility that some of them may be spring salmon ("Chinook salmon" or "king salmon"; *O. tshawytscha*) cannot be ruled out (Berry 1992).

When species richness between the three structures is examined (using taxa from floor and non-floor deposits), the large housepit has far more taxa than the medium-sized or small structures (HP 7 = 18, HP 3 = 6, HP 12 = 3; Table 2 and Figure 8).⁹ As with the floral data, the logarithm of the total number of specimens (LNISP) plotted against that for each housepit (not shown) falls on the same line, indicating a correlation between assemblage size and number of taxa. While a larger number of rare faunal items is found in the large housepit, we expect more taxa simply because of the relative size of the assemblage. However, since the faunal assemblages from these houses are virtually 100% samples of identifiable remains, sample size is not a major issue (Plog and Hegmon 1993:490). Thus the presence of more taxa in the large house probably is due to the more diverse activities involving animal remains of its inhabitants (i.e., hunting, trade, ritual) compared to the smaller houses.

As with the plant data, it is informative to compare the rates at which animal taxa are added per specimens in each housepit (Figure 9). Comparing the slopes of the three lines in Figure 9 we see that the medium-sized housepit differs significantly from the other two (ANOVA f-test for homogeneity of slope; $p < 0.0001$), but the large and small houses have similar slopes (ANOVA f-test for homogeneity of slope; $p = 0.374$). Based on the steepness of the slope, we conclude that the small and large housepits are accumulating species/specimens at a significantly

FIGURE 8.—Abundance of faunal taxa recovered from three housepits. "Artiodactyl" includes deer, sheep, elk, and unidentified artiodactyl remains.

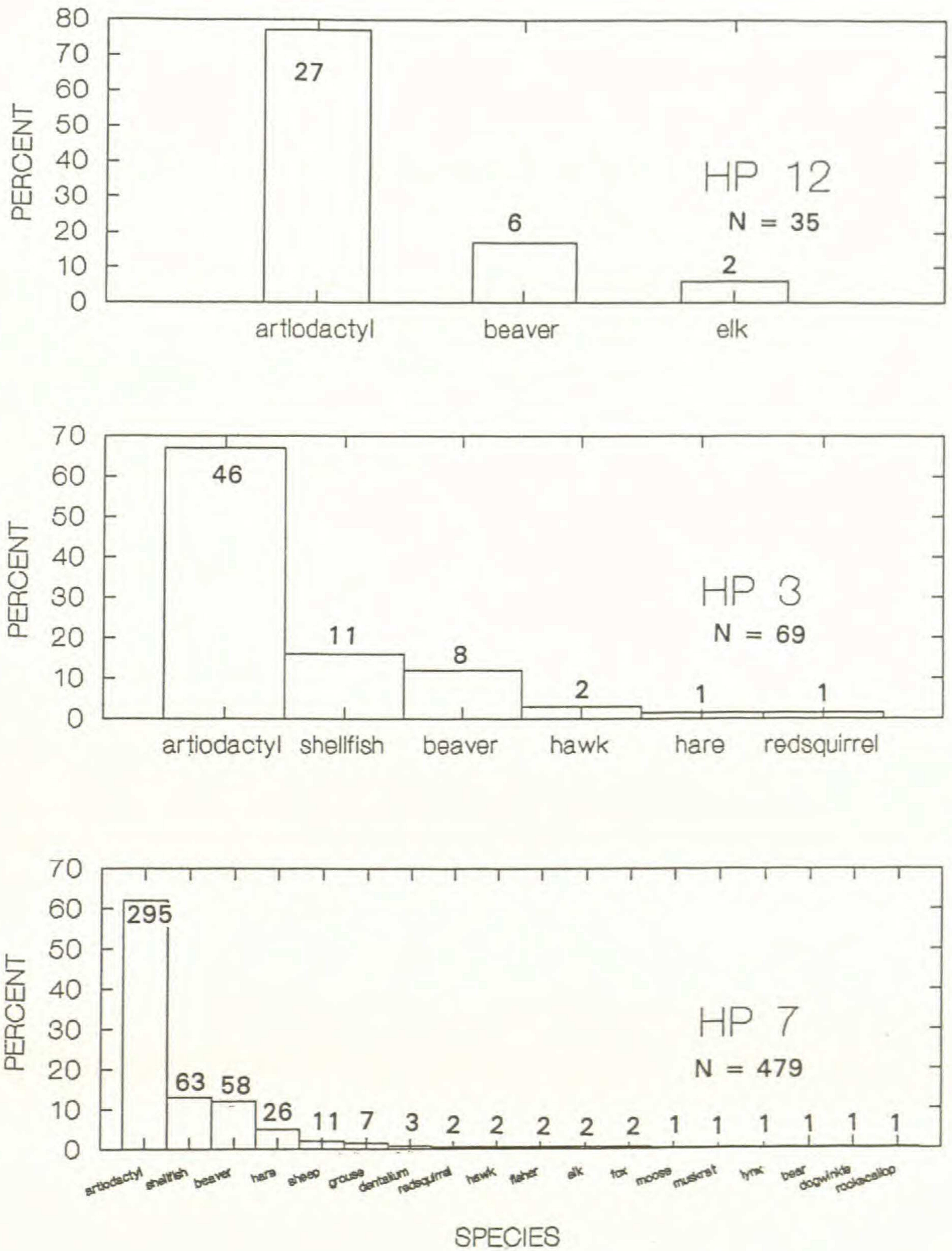
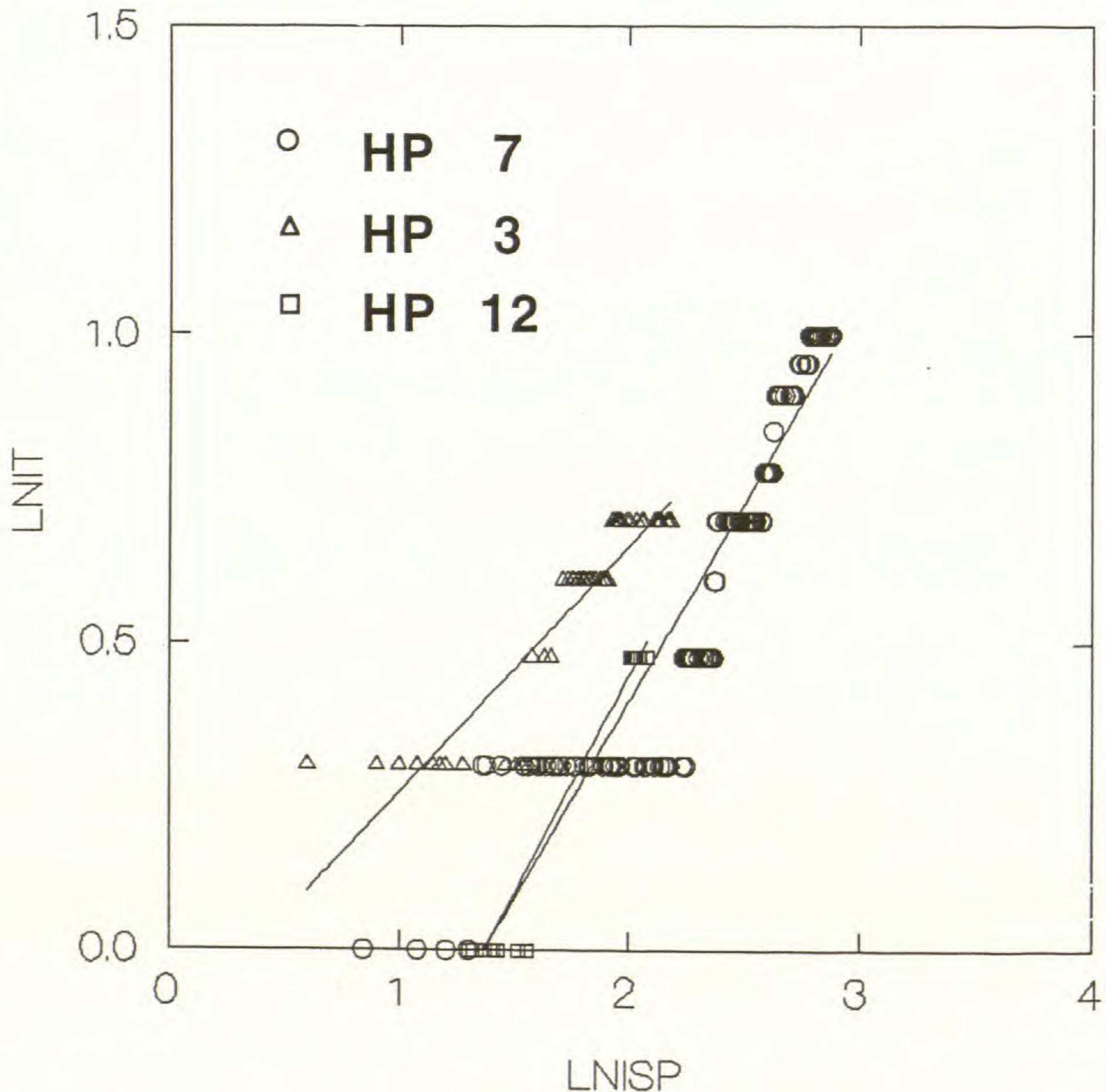


FIGURE 9.—Log number of identifiable faunal taxa (LNIT) plotted against log number of identifiable specimens (LNISP) recovered from three housepits, illustrating accumulation rates of animal taxa per specimens.



higher rate than the medium-sized housepit.

In terms of species evenness, the three housepits have similar distributions (Figure 8), and the shapes of the slopes of the three housepits cannot be distinguished statistically (Kolmogorov-Smirnov test, all *P* values approaching 1.0). The relatively high frequencies of artiodactyl and beaver in the three housepits is notable, as is the absence of shellfish and relative abundance of elk in the small housepit. With the exception of hare, sheep and grouse in the large housepit, the large and medium-sized housepits have similar distributions of remains.

DISCUSSION

Archaeobotany.—The results of the archaeobotanical analyses indicate that intensity of plant use is correlated with housepit size. The large structure stands out

clearly as having the greatest density of remains, the greatest number of taxa relative to the density of remains, and the most rapid accumulation of taxa relative to the number of specimens. Conversely, the small housepit has few remains, few taxa, and low accumulation rates of species. The medium-sized housepit is intermediate in species density, richness, and species accumulation rate. These archaeobotanical data support our first hypothesis that differences in the size of residence structures should correlate with differences in socioeconomic status, as indicated by greater density and diversity of remains.

Our second hypothesis asserts that larger residences should exhibit greater internal differentiation than smaller structures, corresponding to distinct domestic subgroups with differential socioeconomic status. This hypothesis would be supported by the presence of regular, repeated patterning of remains and the presence of special or restricted items associated with some of these patterned remains. We examined three sources of archaeobotanical evidence which could support or reject this hypothesis: the distribution of food-plant processing areas, the distribution of the remains of non-food plants, and the pattern of areas with no plant remains.

Distinct plant food processing areas can be identified on the floors of the large and medium-sized housepits, but not the small one. In the large housepit, we identified one primary food plant processing area, associated with a hearth, and two additional minor processing areas. In the medium-sized housepit, one primary and two smaller plant food concentrations, each associated with hearth areas, were also identified. The spatial extent and species diversity of the larger concentrations suggest that these areas were used repeatedly for plant processing. The smaller concentrations may have been unique events.

Similarly, the distribution of non-food plant remains indicates that the floors in the large and medium-sized housepits were partitioned in a similar manner, and were distinct from the small housepit. The placement of floor or bench coverings along the edge of the large and medium-sized housepits delineates the periphery of those structures from the remainder of the housepit. The remains of conifer boughs (and grass in the large housepit) distinguish the peripheral areas as places where people regularly sat and/or lay down. No such area was identified in the small structure.

The only archaeobotanical pattern which is consistent among all three housepits is the relative paucity of remains in the center of the floors. The center of each structure may have been used equally by all members of each pithouse for communal events or activities. Given that the clear space is only about three m² in the small structure, these activities—at least in the case of the smaller structure—could not have required much room.

Thus, in contrast to the predictions of our second hypothesis, there is no evidence of regular, repeated patterning of archaeobotanical remains which would indicate distinct domestic subgroups in any of the housepits. The presence of only one major plant processing area in the large and medium-sized structures suggests that plant processing may have been a communal activity. Further, the relatively continuous distribution of needles around the peripheries of the larger houses does not support the presence of distinct domestic subgroups. The archaeobotanical

remains in the small structure indicate limited plant processing and suggest that plant processing activities there were communal.

Zooarchaeology.—Consistent with our conclusions from the archaeobotanical remains, and in support of our first hypothesis, the density and diversity of faunal remains correlate well with housepit size. The largest structure has the greatest density of faunal remains, followed by the medium-sized housepit. Similarly, faunal species richness was correlated with structure size. However, rates of species accumulation provided ambiguous results with regard to the first hypothesis, with the large and small housepits having higher rates than the medium-sized housepit. Notably, a number of special types of faunal remains were found only in the large housepit. For example, fox, grizzly, bighorn sheep, and rock scallop (a trade item) were found on the floor, while hawk wing bones, dentalium, dogwinkle, and rock scallop (trade items) were found in the storage pits.

In support of the second hypothesis, and in contrast to the evidence from the archaeobotanical remains, the largest house exhibits regular, repeated patterning of faunal remains. Faunal remains in the large housepit are associated with a number of storage pits and fire-reddened areas, and artiodactyls and fish seem to have been processed and consumed in four distinct areas of the house. In contrast, faunal remains in the medium-sized structure are less discrete, although concentrations of fish associated with fire-reddened areas and storage pits suggest two animal consumption/processing areas within the house. This suggests that activities related to the processing and consumption of animals were more communal than in the large house. The small housepit has the simplest patterning, with a single, diffuse concentration of remains, suggesting that animal processing activities were communal in this structure as well.

Based on the predictions of our second hypothesis, the four distinct consumption/processing areas associated with storage pits and hearths indicate the presence of four domestic subgroups in the large housepit. These faunal consumption/processing areas are distinguished from each other by the presence of special faunal items or evidence for distinct types of activities, such as woodworking. This suggests socioeconomic differences among the four domestic subgroups in the large house.

CONCLUSIONS

Together, the paleoethnobotanical and zooarchaeological analyses offer some support for the hypothesis that housepit size correlates with socioeconomic status. Based on the density and diversity of both the plant and animal remains, the large housepit was used more intensively and was the site of more diverse activities than the smaller housepits. The presence of rare faunal items in the large housepit also sets it apart from the other structures. However, whether this patterning of plant and animal remains can ultimately be related to status differences, to a larger work force having access to a more diverse resource base, or to differences in the length of use of the floor before abandonment cannot be answered with the present data alone.

The zooarchaeological analyses alone support the hypothesis that larger residential housepits exhibit greater internal socioeconomic differentiation than smaller structures. The regular, repeated patterning of faunal remains in the large housepit indicates that the large structure was divided into distinct domestic subgroups which may have been of unequal socioeconomic status. The presence of a number of distinct domestic subgroups in the large structure is further supported by the repeated occurrence of hearths around the perimeter of the house, and by storage pits, clusters of fire-cracked rocks, debitage, stone tools, anvils, and abrading stones associated with those hearths.

How do we reconcile the varying pictures that emerge from the faunal versus botanical data concerning internal socioeconomic differentiation within the housepits? The patterning of plant remains suggests that internal domestic subgroups within the three structures were not distinct and that housepit activities involving plants were undertaken communally. However, it may be that the presence of a single, major plant processing area in the largest structure represents the specialized use of plants by one domestic subgroup within that house, rather than communal use by all inhabitants. This plant processing area is associated with a domestic subgroup which, based on the faunal data, appears to have held relatively high status. Future research should test hypotheses which distinguish between these scenarios.

The distributions of both plant and animal remains among the houses suggest that internal domestic subgroups were less pronounced and activities were undertaken more communally in the smaller structures. Finally, the absence of both plant and animal remains in the centers of all three housepit floors suggests that the center of each structure was used equally by all members of each pithouse for various communal events or activities.

In this study we examined not only overall species richness from our samples, but the pattern of accumulation of species with sample size. This allowed us to make inferences regarding taxonomic diversity in each housepit beyond simply estimating the total number of species present. Our analyses support the conclusions of Plog and Hegmon (1993) that species richness in archaeological samples should not be treated merely as an artifact of sample size, but as a consequence of the combined effects of behavioral processes and sample size. By examining in detail the relationship between number of taxa and number of specimens, we are able to evaluate better the effects of sample size on our data. Despite the differences in sample size among the housepits, we are able to draw conclusions regarding the role of behavior in generating patterns of species diversity.

This study demonstrates a useful role for combined paleoethnobotanical and zooarchaeological analyses in studies of prehistoric social and economic organization. Separately, the analyses provide independent lines of evidence which can be used to test our hypotheses. Combining the two sets of data allows us to re-evaluate and modify our original conclusions. Our analyses of both plant and animal remains support the notion that Keatley Creek was occupied by residential corporate groups of differing economic and social status. However, the three housepits examined here represent less than 3% of the housepits in the village of Keatley Creek. A much larger sample of housepits, representative of the range of

housepit sizes, is needed before we can draw more definitive conclusions about the prehistoric socioeconomy at Keatley Creek.

NOTES

¹ Analyses of organic remains from housepit rim and roof deposits, details of faunal and floral taphonomy and site formation processes, and a discussion of plant and animal use at Keatley Creek as a whole are presented elsewhere (Kusmer 1993a, 1993b; Lepofsky 1993a, 1993b). Refer to these studies for detailed presentations of the raw data.

² Based on modern observations of wood decay.

³ Based on modern observations of wood decay and ethnographic statements (Wilson 1934:372; McGuire and Schiffer 1983:291; Condrashoff 1980:5).

⁴ All identified fish remains at the site are salmon (*Oncorhynchus* spp.), thus all fish in all analyses are assumed to be salmon.

⁵ This is supported by Hastorf's (1991) observation that charred seeds in houses are less dense in areas where many activities occur.

⁶ All data for archaeobotanical and zooarchaeological ANOVAs were transformed before analysis using square root transformation for normalizing poisson distributed data. Zooarchaeological data for the small and medium housepit remained skewed even after transformation.

⁷ We recognize that density is a complex issue and may be related to other factors (e.g. length of occupation, differential discard patterns) in addition to intensity of use. Despite this, it can be a useful measure of difference between the structures.

⁸ The number of taxa in the large (HP 7) and medium housepit (HP 3) are inflated because we are unable to go back to many of the original samples and group the unidentifiable seeds into like taxa. Since the majority of taxa are represented by only a single specimen, this will not significantly alter the analysis. Any biases that are introduced should be parallel in both housepits.

⁹ Since we feel the analyzed faunal remains represent well the actual distribution of remains, we do not need to graphically examine the distribution of bones as we did for the plants in Figure 5. Further, the plots in Figure 5 are not well suited to the faunal data. The faunal data are represented by many more specimens than taxa, whereas the situation is reversed with the floral data. Because of this, the faunal data displays a step function distribution when NISP are plotted against NIT. The step function makes it considerably more difficult to determine when the graph has leveled off.

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